

REMARKS

Claims 2-5 were examined in the Final Office Action mailed February 21, 2007. The following rejections are pending:

- Rejection under 35 U.S.C. § 112, first paragraph, of claim 5 as not complying with the written description requirement on the ground that the language “such that $(B/A) \times (G/R) = 1$ ” and “such that $R1 = \{(B/A) \times (G)\} / Q$ ” are not supported by the specification.
- Rejection under 35 U.S.C. § 112, second paragraph, of claim 5 as indefinite for use of a mathematical sign not known by the Examiner or defined in the specification.
- Rejection under 35 U.S.C. § 103(a) of claims 2-5 as unpatentable over U.S. Patent No. 4,640,409 to Holtman (“Holtman”), in view of U.S. Patent No. 5,934,663 to Saito, *et al.* (“Saito”) and U.S. Patent No. 6,446,954 to Lim (“Lim”).

The Applicant wishes to express his appreciation for the courtesies extended in the Interview conducted on April 16, 2007. The foregoing amendments and following remarks are consistent with the discussions in the Interview.

1. **Withdrawal of the § 112, First Paragraph, Rejection Is Requested:** The Applicant respectfully traverses the pending rejection of claims 2-5 under § 112, first paragraph, on the ground that the original written description meets the requirement for a description of the invention which permits a person skilled in the art to make and use the invention.

With regard to the first issue raised in the February 21, 2007 Final Office Action, the basis for the equation $(B/A) \times (G/R) = 1$, the Applicant respectfully notes that specification at page 2 links the diameters of the rollers to the gear ratio, such that the roller's peripheral velocities are equal:

In this case, as the rigid roller and the elastic roller are connected with gear wheels, *the diameter of each roller is determined so that the peripheral velocities of both the rollers coincide with each other* in consideration of the gear ratio. The diameters of this state are hereafter referred to as equal-velocity diameters.

Specification at 2. One of skill in the art would immediately recognize that the mathematical expression of this text is the recited equation, *i.e.* that the ratio of the roller diameters (B/A) must be the inverse of the gears' ratio (R/G), such that $(B/A) \times (G/R)$ must equal 1. Indeed, the specification proceeds to provide a specific numerical example of this relationship. In the Detailed Description at page 13, examples of roller diameters and gear sizes which achieve equal peripheral velocities are provided, using 12 mm/16 mm rollers, and 32 teeth/24 teeth gears. In view of this written description, the Applicant respectfully submits that the equation $(B/A) \times (G/R) = 1$ is fully supported by the original written description.

With regard to the roller diameter equations $R1 = \{(B/A) \times G\}/Q$ and $R2 = \{(B/A) \times (G+P)\} /Q$, the specification similarly includes sufficient support. In the specification paragraph spanning pages 18-19, the calculation of the first and second diameters is described, and the correction is described in terms of how the first and second diameters differ from the theoretical equal-velocity diameter (referred to in the specification as the "diameter before correction"). While this correction is not specifically denominated in the specification with the letter "Q" used in claim 5, the Applicant respectfully notes that there is no requirement for exact correspondence between labels used in the claims and labels used in the written description, and that in any even one skilled in the art would recognize

that the recited R1 and R2 equations are plainly the mathematical expression of the described relationships. Thus, the Applicant respectfully submits that the roller diameter equations $R1 = \{(B/A) \times G\}/Q$ and $R2 = \{(B/A) \times (G+P)\}/Q$ are also fully supported by the written description.

In view of the forgoing remarks, the Applicant respectfully requests the pending § 112, first paragraph, rejection be reconsidered and withdrawn.

2. The § 112, Second Paragraph, Rejection Has Been Addressed: In response to the pending rejection of claims 2-5 under § 112, second paragraph, the Applicant has amended the claim by replacing the objected-to symbol with the symbol “≈”, consistent with the immediately preceding claim language reciting “approximately equal to.” Withdrawal of the pending § 112, second paragraph, rejection is respectfully requested.

3. The Claims Are Patentable Over Holtman, *Et Al.* Under § 103(a): The Applicant respectfully traverses the rejection under § 103(a) of claims 2-5 as unpatentable over Holtman, Saito and Lim on the ground that these references, alone or in combination, fail to teach or suggest all of the features of the present invention recited in independent claim 5 and its dependent claims 2-4.

The Present Invention: Claim 5 recites, *inter alia*, an image forming apparatus in which a rigid roller and an elastic roller are driven by a group of gears “so that the peripheral velocities of each of the pair of rollers are approximately equal to each other.” Further, the diameter of the elastic roller is set between a virtual maximum diameter R1 and a virtual minimum diameter R2, the virtual minimum diameter R2 being defined taking account of the

thickness of the copy sheet that passes between the rollers “such that the peripheral velocity of the elastic roller at the part depressed due to the pressing of the elastic roller against the rigid roller ... coincides with the peripheral velocity of the rigid roller such that $R2 = \{(B/A) \times (G+P)\} / Q$.”

The Holtman Reference: The Applicants respectfully submit that the Holtman reference not only does not teach or suggest features of the present invention for which it is cited, but in fact teaches exactly the opposite.

Holtman is cited as teaching the present invention’s approach to optimizing roller diameter selection, with the recited $R1 < R' < R2$ relationship. February 21, 2007 Final Office Action at 3. Review this reference, however, reveals that it operates in a fundamentally different manner than the present invention, and teaches nothing regarding limiting its elastic roller to be within the recited virtual diameter limits.

Claim 5 requires that the rigid and elastic rollers be geared to one another, such that the gearing defines the relative rotational speeds and associated roller peripheral velocities. Accordingly, in order to ensure that the peripheral velocities remain the same in the region at which the rollers contact one another (*i.e.*, where the elastic roller is deformed), and thereby the copy sheets travel on the desired paths (*e.g.*, not curled in one direction or the other due to being driven at different speeds on opposite sides of the sheet), claim 5 requires the elastic roller to be sized in accordance with the recited relationship so as to account for the thickness of the copy sheet.

In contrast, Holtman himself states that velocity “is practically independent of the roller diameters” (Holtman at 2:15-20) as a result of the degree of deformation of the elastic rollers being “*completely immaterial*” to the matching of velocity of roller 21 to roller 24 (Holtman at 3:9-19 (emphasis added)). This is a consequence of Holtman’s fundamentally different design: the present invention’s driving roller is in direct contact with the elastic roller, and therefore any variations in the elastic roller diameter results (due to the direct gear drive between the rollers) in variations in peripheral velocity and thus copy sheet handing; in the Holtman apparatus the rigid driving roller 21 *indirectly* drives another rigid roller 24 through an *intermediate, elastic* roller 26. Holtman Figs. 1, 3 (in Fig. 1, rollers 3, 1, 5 correspond to rollers 21, 24, 26).

As a result of this indirect drive, *there can be no variation of peripheral velocities between rigid roller 24 and elastic roller 26*, because the elastic roller 26 is driving the rigid roller 24. The rigid roller’s peripheral velocity therefore always follows the elastic roller’s peripheral velocity, regardless of the diameter of the elastic roller (there being no gear arrangement to fix the relative rotational speeds of the rollers). Moreover, there would be no suggestion or motivation to add the Lim gears to the Holtman indirect-drive rollers, because no matter what the diameter of the elastic roller, the elastic roller would be deformed an equal amount at both roller 21 and roller 24 contact points, so that the peripheral velocities of the rigid rollers and the elastic roller would continue to be defined by the velocity of roller 21 (in other words, by using the fundamentally different approach of driving two rigid rollers with and

intermediate roller, Holtman's roller velocity is effectively the same as if the two rigid rollers 21, 24 were directly in contact with one another). Of course, Holtman's complete independence from the need to control elastic roller diameter is entirely consistent with the Holtman specification's total lack of any discussion of the need to provide the elastic roller with a diameter within a certain range, let alone provide even the slightest hint of the need to control elastic roller diameter in the tightly-controlled manner recited in claim 5.

Because Holtman does not teach or suggest the features of the image forming apparatus of claim 5 for which it is cited, and in particular does not teach or suggest the recited elastic roller diameter limitations, and further because there would be no suggestion or motivation to combine this reference with the Lim reference (there being no way for the present invention to result from the combination, as the Lim gears would not drive the Holtman rollers in the manner of the present invention), the Applicants submit that claim 5 and its dependent claims 2-4 are patentable over these references¹ under § 103(a).

Reconsideration and withdrawal of the pending § 103(a) rejection of claims 2-5 is respectfully requested.

CONCLUSION

In view of the foregoing, the Applicant submits that claims 2-5 are in condition for allowance. Early and favorable consideration and issuance of a Notice of Allowance for these claims is respectfully requested.

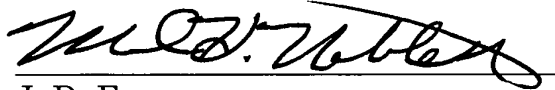
¹ For its part, the Saito reference, cited for use of roller rollers, does not cure the deficiencies of Holtman and/or Lim.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #100689.53997US).

Respectfully submitted,

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